

### REMARKS/ARGUMENTS

The claims are 1-4, 9, 11-13, 16-21 and 23-24. Claim 1 has been amended to incorporate the subject matter of claims 7, 8 and 10 and to recite that the dental material has a maximum setting time in a patient's mouth of 10 minutes as determined according to ISO 4823, 1992 version. Accordingly, claims 7, 8 and 10 have been canceled, and claims 9 and 16, which previously depended on claim 7 and claims 1-15, respectively, have been amended to depend on amended claim 1. Claims 5, 6 and 14 have also been canceled in view of the amendment to claim 1. Claim 2 has been amended in the same way as claim 1, and claim 15 has been canceled in view of the amendment to claim 2. Claim 12 has been amended to correct a clerical error, and new claim 24 dependent on amended claim 1 has been added, which combines the features of claims 9, 11, 12 and 17. Support for the claims may be found, *inter alia*, in the original claims and at page 35, last paragraph. Reconsideration is expressly requested.

Claim 8 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to include the ending period. The Examiner apparently overlooked the period appearing

at the end of claim 8 at page 10 of Applicants' previous Amendment filed August 14, 2009. In any event, Applicants have canceled claim 8 herein, thereby obviating the Examiner's rejection under 35 U.S.C. 112, second paragraph.

Claims 1, 2, 7-21 and 23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Yano et al. U.S. Patent No. 6,077,896 alone, or over Yano et al. in view of Schwabe et al. U.S. Patent No. 6,218,461, or over Yano et al. and Schwabe et al. in view of Bublewitz et al. U.S. Patent Application Publication No. 2002/0156186, or over Yano et al. and Schwabe et al. in view of Bachon et al. U.S. Patent Application Publication No. 2005/0260401. Claims 1, 2, 5-21 and 23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Yano et al. in view of Renga U.S. Patent No. 4,375,549 and Panster et al. U.S. Patent No. 4,362,885. Claims 1, 2, 5, 6, 10-14, 16-21, and 23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Müller et al. U.S. Patent No. 5,118,290 in view of Renga, Panster et al. and Schwabe et al. Claims 1-6, 10-14, 16-21 and 23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Müller et al. in view of Renga, Panster et al. and Schwabe et al. and further in view of Bublewitz et al. '186.

In response, Applicants have amended claims 1 and 2 to better define the invention and respectfully traverse the Examiner's rejection for the following reasons.

As set forth in claims 1 and 2 as amended, Applicants' invention provides a condensation-crosslinking dental material containing at least one alkoxysilyl-functional polyether and at least one catalyst or a component containing at least one catalyst and water. The at least one catalyst is a salt that is formed from at least one cation selected from cations formed by protonation of a base with a  $pK_{BH^+}$  value of at least 21 measured in acetonitrile. The base has at least one structural unit according to the general formulae I, II, and/or III set forth in the claims and at least one anion of branched carboxylic acid with a length of the (cyclo)alkyl chain provided on the carboxyl group of at least 3 carbon atoms, or an unbranched carboxylic acid with a length of the (cyclo)alkyl chain provided on the carboxyl group of at least 5 carbon atoms. In this way, Applicants' invention provides a condensation-crosslinking dental material which has a maximum setting time in a patient's mouth of 10 minutes as determined according to ISO 4823, 1992 version.

Thus, with Applicants' dental material as recited in claims 1 and 2 as amended, setting can take place under ambient temperatures within only a short setting time which is an outstanding property that is in no way achieved by any of the prior art references cited by the Examiner.

The primary reference to *Yano et al.* discloses a composition that is used as an elastic sealant in the fields of building and construction works and industrial applications. See column 7, lines 3-5. As discussed in Applicants' previous Amendment filed August 14, 2009, these materials of *Yano et al.* cure by the presence of the humidity present in the ambient air, which generally takes days if no increased temperatures are used for curing these compositions, and cannot cure under the conditions in a patient's mouth. Thus, the compositions of *Yano et al.* are entirely unsuitable for dental purposes.

As recited in Applicants' claims 1 and 2 as amended, selected strong bases are used to be protonated to become the cation of the catalyst salt, which bases exhibit a  $pK_{BH^+}$  value of at least 21 and contain at least one of the structural units according to formulae I, II and III. These special bases are combined with specific weak acids providing the anion for the catalyst salt. In the specific weak acids, the length of the (cyclo)alkyl chain must not be too short. Therefore, the chain

length of a branched carboxylic acid is at least 3 carbon atoms, whereas the chain length of an unbranched carboxylic acid is at least 5 carbon atoms.

This particular combination of cations and anions for the catalyst salt surprisingly results in advantageous setting hardening kinetics for condensation-crosslinking alkoxysilyl polyether systems. Thereby, fast setting impressions of teeth can be prepared with processing times suitable for practical use in a patient's mouth.

Applicants have carried out a large number of experiments and generated a variety of examples for preparing and utilizing different catalyst salts. Some of these experiments are shown as Examples and Comparative Examples in Tables 1 and 2 of Applicants' disclosure.

Summarizing the findings of Applicants, it is important for the catalyst salt that the strong base exhibits a certain  $pK_{BH^+}$  value. Bases showing a lower  $pK_{BH^+}$  value are not suitable for proper setting times. In contrast to the Examples shown in Applicants' disclosure, the setting times according to prior art compositions were more than 30 minutes or 60 minutes or the compositions did not even react. Furthermore, the structural units according to formulae I, II and/or III allow for mesomeric

stabilization of the positive charge after protonation of the base. Hence, stable catalyst salts can be obtained.

On the other hand, the particular selection of the weak acid for providing the anion is likewise important. As the experiments of the Applicants demonstrate, the length of the (cyclo)alkyl chain must not be too short. Therefore, simpler forms of acids such as propiolic acid, propionic acid and butyric acid, as mentioned by the Examiner in the Office Action, are not appropriate for forming a catalyst salt which serves for an appropriate setting time. In other words, it would not be possible by such simpler forms of acids to attain the surprisingly short-setting time at ambient temperature.

Due to the nature of the catalyst salt according to Applicant's claims 1 and 2 as amended, as a whole, this salt shows a sufficiently high solubility in the polyester materials. Therefore, the amount of catalyst salt to be used can be kept as small as possible, while the catalytic activity of the salt remains sufficiently high.

Applicants' previous Amendment filed August 14, 2009 set forth in detail the differences between Applicants' condensation-crosslinking dental material and the prior art relied on by the

Examiner. Thus, the compositions of *Yano et al.* are unsuitable for dental purposes as they show no setting under the conditions in a patient's mouth in an appropriate manner. Moreover, a particular selection of specific strong bases and specific weak acids each having certain important key properties is nowhere disclosed or suggested by *Yano et al.* alone or in combination with the secondary reference to *Schwabe et al.* The remaining references to *Müller et al.*, *Bublewitz et al.*, *Bachon et al.*, *Renga*, and *Panster et al.* are likewise no more relevant. None of these references discloses or suggests the specific condensation-crosslinking dental material recited in Applicants' claims 1 and 2 as amended or the benefits that are achieved by that material.

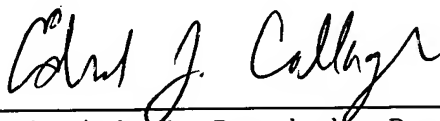
Accordingly, it is respectfully submitted that claims 1 and 2 as amended, together with the dependent claims which depend directly or indirectly on claims 1 or 2 as amended, are patentable over the cited references.

New claim 24 is dependent on claim 1 and further specifies particular bases, the details of the cation of the catalyst salt, the particular acids, and the third structural unit of alkylene spacers, each located on the terminal alkoxysilyl groups, of the at least one polyether. It is

respectfully submitted that the combination of features set forth in new claim 24 is nowhere disclosed or suggested by any of the prior art cited by the Examiner. Accordingly, it is respectfully submitted that new claim 24 is patentable over the cited references for this additional reason.

In summary, claims 1, 2, 9, 12 and 16 have been amended, claims 5-8, 10 and 14-15 have been canceled, and new claim 24 has been added. In view of the foregoing, withdrawal of the final action and allowance of this application are respectfully requested.

Respectfully submitted,  
Alexander BUBLEWITZ ET AL

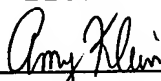


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Amy Klein

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